

# *The Rock Garden*

— Henry T. Skinner —



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*"Build it well whate'er you do"*

The cover illustration is a photograph by P. J. van Melle

# The Rock Garden

HENRY T. SKINNER

ROCK GARDENING continues in popularity in New York State. True, that great surge of rockery erection which swept the entire country a decade ago appears to be, perhaps fortunately, on the wane. But rock gardens are still being built; they are, however, of not quite the same types that have been seen and sometimes endured in the past. The best will be liked, for today one finds the beginnings of a new philosophy in this younger branch of gardening.

To the modern intelligent builder both the importance of rock for rock's sake and the importance of plants for the plant itself have diminished. The rock pile of the earlier periods demonstrated, if anything, too clearly that something was lacking. That something, it is now realized, was design. Some gardeners are and always will be interested far more in the production of plants than in the production of a picture painted with plants; a few collect rocks for the diverse forms or tints rather than for their value as structural material in the formation of that picture which is never complete until softened and enlivened with plants. But as the artist chooses his colors for the effects he wishes to produce so does the real rock gardener choose and place his plants where their form, texture, and color will be most effective in declaring the single message of the whole.

Only through a clear appreciation of that design which takes into account the laws of rock distribution and occurrence, as well as the habits and uses of plants, can nature's unity, simplicity, and ultimate beauty be truly reproduced in the garden. It is clear, then, that at the present time popular rock gardening is becoming established upon a firmer basis than in the past. Its development will continue upon surer lines only as rapidly as its real principles and place come to be generally recognized and accepted.

Many excellent and detailed books have already been written upon rock-garden design, as well as upon the related topics of construction methods and of the cultivation of rock plants. The aim of this bulletin is not to duplicate this information but to present in concise form an elementary outline of the underlying principles of this form of garden expression.

## KINDS OF GARDENS

THE INITIAL purpose of the garden must be definite, its objectives to be attained clear-cut. What will be the most suitable type of garden? What kind will fit easiest into the existing landscape scene?

Generally speaking, most rock gardens can be classified under one or the other of two clearly differentiated types: the formal and the informal, or naturalistic. The formal motif has the rocks arranged in artificially planned patterns as walls or steps or paving; the naturalistic, though equally planned, follows, not regularity of line, but the informality of nature—the lines of the winding brook, the hills, and the hollows of natural broken ground.

The possibilities of the individual property are extremely important, for it is of this property that the rock garden will inevitably become an integral part. If the property consists of only a small and formal city yard, a naturalistic rock garden, however finely executed, may never seem more than a rock pile out of place; a small paved court would accommodate the plants and perhaps be infinitely more in keeping with the straight and formal lines established by the house.

## SITE

SITE is of primary consideration. On most small properties, desirable locations are definitely limited. The garden plot may have a low bank running along one side or, at the far end, a shady corner. Either of these sites has real possibilities. A depression or a small knoll may afford a key. Should there be a stream, Providence is kind indeed, for such a site is exceptional. To every ideal spot there are a hundred garden plots with just a lawn and a little space beyond, and it is good to know that here, and in practically any other imaginable area, a rock garden can be had if it is rightly designed and built.

## RELATION OF SITE TO DESIGN

The place of the formal rock garden is near the house or near the "out-door living room" or formal garden area. The place of the informal rock garden, on the other hand, is in the farthest corner, or that part which is the wildest or most secluded. It is a mistake to build such a garden immediately against a house or, in that worst position of all, as the central feature of a front lawn. On those properties where a naturalistic site cannot be found, it would be far better to forget this type of rock garden and to choose instead a more formal arrangement of terrace wall and crannied flagstone path.



FIGURE 1. ROCK AND ALPINE PLANTS IN A TINY FORMAL GARDEN  
This is perhaps the best kind of rock garden for a small city property

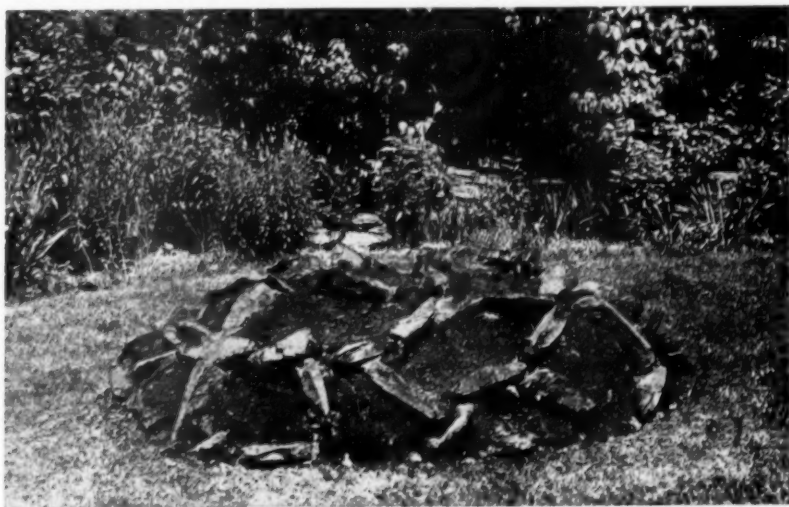


FIGURE 2. AN ENTIRELY UNNATURAL ARRANGEMENT AS TO PLACEMENT AND DESIGN  
This shows the worst mistakes that can be made in an attempt at rock gardening

Some little confusion exists as to where formality should leave off and informality begin. It is no less common to observe formally paved pathways in a naturalistic rock garden than it is to see a bank of very straight lines given a pseudo-naturalistic treatment by dotting it with rocks. Both of these situations would be benefited by a reconsideration of purpose and effects. The question is simple: Would the naturalistic garden be improved by eliminating formality? Would the bank, so long as its lines are straight, be more effective as a wall or, if naturalism is preferred, could not the straight lines be modified to encourage that effect? Formality and informality in design produce the most satisfactory results where the distinction between them is maintained. But inasmuch as a combination of styles is occasionally permissible and quite effective, the final solution must rest upon good taste and judgment rather than upon rules of a too hard-and-fast nature.

If a natural rock deposit already exists, these intricate problems of placement and design will be largely solved. The chief task here will be to improve the formation by such clearing and reworking as may be necessary and then, by suitable planting, achieve for it a harmonious setting. With such a situation a satisfactory garden picture may be produced at a minimum of expense and labor.

#### EXPOSURE

An open exposure to the full strength of the southern sun will, in summer be subject to drought; in winter, to the maximum adverse effects of alternate freezing and thawing of the soil. The same applies to some extent in open exposures to the west. If any choice exists, a situation facing north or north-east is to be preferred; usually the sunlight will be enough, and those plants that are accustomed to climates of less extreme variations will greatly appreciate the additional coolness and moisture.

In growing a wide selection of plants, there will always be those with a preference for full sun and also those that succeed best in partial or entire shade. Situations can normally be found to meet these extremes, together with ample space for those plants that are less particular in their requirements. Under any exposure, additional shade can always be obtained by planting trees with light-textured foliage. Flowering dogwood (*Cornus florida*) and red bud (*Cercis canadensis*) are excellent for this purpose.

#### BACKGROUND

Upon any property limited in extent, some background planting is needed. Time is saved in developing such a background if a site can be found in front of existing shrubbery or trees. Light shade for part of the day may not be

objectionable, but it is unwise to select any position that is immediately beneath large trees, for considerable damage results from moisture dripping from overhead; the shade may be too intense and, particularly with elms and maples, there is always the likelihood that the tree roots will penetrate the rock mass and compete with the plants for moisture and nourishment.

## ROCKS

THE KIND of scene that is to be depicted from field or glen will be decided to a great extent by the type of rocks which is convenient to use. Each kind has its characteristic natural structure and formation. Unless these peculiarities are understood and unless the rocks are placed in relationship to one another in the garden as they might be found in the field or on the mountain side, the result can never be fully satisfying. A far more pleasing garden may result from ten well-chosen rocks, well placed, than from a hundred merely piled together. But whether ten rocks or a hundred are used, the principles of their proper arrangement are the same. The results are unfortunate if these principles are neglected. One must, therefore, know at least the more commonly available rocks to use them correctly in a garden.

All rocks may be, for general purposes, classified into two types: stratified and unstratified. Those mentioned in the following paragraphs may be found in various parts of central New York. Locality, individual preferences and cost undoubtedly will determine which of the several kinds is most satisfactory for a particular garden.

### STRATIFIED ROCKS

Stratified rocks have been laid down in beds, usually in horizontal layers, mainly by water and wind. Since the original deposition of these rocks,

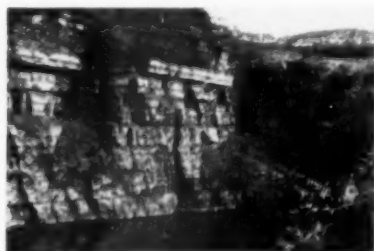


FIGURE 3. A CAYUGA LIMESTONE QUARRY  
Lines of stratification are horizontal; jointing is vertical

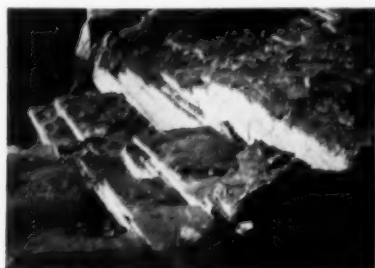


FIGURE 4. SANDSTONE OF THE ITHACA GORGES  
Primary joints may be conspicuous

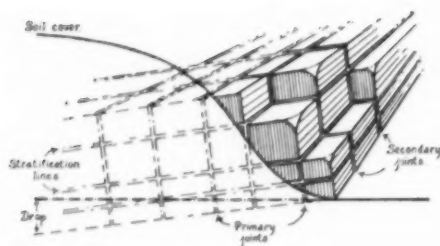


FIGURE 5. STRATIFIED ROCK IN SECTION

Strata may not always be horizontal. Exposed rocks lose their angular appearance through weathering

verse, or secondary, joints, until seemingly a solid deposit of stratified rock is seldom actually continuous but is broken into large blocks and cubes, by the joints on two sides and by the lines of stratification above and below.

It is necessary to understand the stratification and the jointing of this type of rock in order to obtain natural effects. It is not enough for the rock gardener to place stones in a series of superimposed horizontal rows, feel confident of this stratification, and henceforth assume that they present a natural appearance. The perpendicular arrangement of jointing is too often disregarded.

Two of the commonest forms of stratified rocks are limestone and sandstone. Where limestone occurs naturally it would be difficult to find a better or more simple rock for the garden. It breaks into easily workable blocks; in a weathered state its exposed surfaces are marked with interesting seams and furrows; it is porous and retains moisture, a character of particular value to the plants which grow in and upon it, and furthermore a great many alpine plants are lime-loving plants. A well-constructed limestone rock garden is hard to equal for natural beauty.

Sandstone is another stratified rock of wide usage. In color, it is brownish to yellow; limestone is usually gray. Sandstone, too, has a large water-holding capacity, is obtainable in blocks of widely varying sizes, and is consequently easy to use. Sandstone is variable in both hardness and texture. Perhaps the softest kinds should not be used because they are inclined to disintegrate rapidly when exposed to the rigors of winter.

### UNSTRATIFIED ROCKS

The greater part of New York State was, many years ago, covered at various times by huge ice sheets. In moving over the earth's crust these masses of ice tore away vast quantities of rock, soil, and debris. These rocks

the crust of the earth has been continually twisting, warping, and turning. The effect of this bending motion has been to sever these deposits by more or less regularly spaced seams, or "joints" usually parallel, and over a wide area, running in approximately the same direction. Other bending movements and the effects of weathering have resulted in trans-



were churned, worn smooth, and transported great distances, to be ultimately redeposited in large miscellaneous masses of what is known as *glacial till*. When eroded through the agency of water, an odd collection of rocks of all shapes and sizes are exposed. Locally, they are known as *hardheads*, or *boulders*. They are for the most part roundish, smooth, and extremely hard, because of their granitic derivation.

In certain localities boulders form the commonest material for rock-garden construction, but their usage presents special problems and necessitates an entirely different form of design and arrangement to that which is in keeping with the stratified rocks. Boulders, because of their hardness and dryness, are not taken to quite so kindly by the plants growing among them. These problems, however, are worth solving if this particular rock is the most accessible.

Hardheads are common throughout New York State. In certain districts, however, notably in the southern counties bordering the Hudson Valley and in the Adirondack region and St. Lawrence County in the north, the parent rock of the glacial boulder, granite, occurs naturally. Granite is a hard volcanic rock appearing in great, enormously solid masses. It weathers slowly. A characteristic outcrop consists of a solid central core surrounded or partly covered by slopes of weathered sharp-edged fragments of widely varying sizes. Granite is not a congenial rock for the garden; it is too hard and inhospitable. A natural outcrop is not easy to adapt and an artificial one is not easy to construct, but it will be used, and often is quite successful where it is common.

In other districts, particularly in the upper Mohawk Valley, there is a brownish spongy rock known as *tufa*. It is largely calcareous in composition and can be traced in origin to the mineral deposits of underground water. It is excellent as a material in which to actually grow plants, because its many holes and fissures permit the plant roots to penetrate the rock itself with comparative ease. From the standpoint of landscape effect, however, tufa is not familiar to most persons. Further, unless it has already taken on



FIGURE 6. GLACIAL BOULDERS

the gray tones and effects of prolonged weathering, its odd appearance, in the garden, smacks rather of the bizarre. But its cultural usefulness outweighs appearance in the eyes of many plant lovers.

## THE INFORMAL ROCK GARDEN

### PLANNING THE GARDEN

#### Design and rock form

**A**LLUSION has already been made to the influence of site upon design. By proper adaptation some suitable expression will be found for practically any site that can be selected and, in choice of this expression, the existing conformation of the land may be of great assistance. For instance, a grass bank could be transformed into a rugged and naturalistic outcrop of stratified rock, or, by the use of different materials, could take on the appearance of part of an age-old glacial moraine; the happy possession of a winding stream gives opportunity to develop a miniature mountain torrent, plunging perhaps now over a rocky waterfall beneath a 4-foot cliff, now slowly meandering through the grassy stretches of an upland meadow. A perfectly level area, by deepening a little here and raising there, can become in the space of a few hours a seemingly deep, stony gully or a sunny, open hilltop. One can travel by field and wild hillside, see a thousand rocky outcrops, stony stream beds, and fern-filled gullies, each a picture in itself and a garden for the making.

A rock garden in the vicinity of frequent or conspicuous natural rock outcrops should, in design, variety, and placement of rocks, as well as in such details as stratification dip, conform as closely as possible to the lines and appearance of the local formation. To build a garden in limestone where in the same glance the eye can view a natural mass of sandstone or granite is to commit an error which offends the aesthetic and horticultural no less than the geologic senses. The rock garden is a play for natural effects. Incongruities are more obvious than in the often-drawn comparison of a Spanish or Italian design in a Long Island garden, where the artificiality is readily apparent. If the ideal rock must be imported, one should by all means use it, but, by choice of site or by effective planting, spare it from direct conflict with what, by its million-year-old claim to occupancy, rightfully belongs there.

Boulders and hardheads never can be made into a stratified outcrop, for their natural site is on rugged boulder-strewn slopes, in disordered array, here scattered apart, there in dense steeples and clusters sustaining a higher shoulder of soil behind them. Never can they be placed in rows or in set designs or patterns. Their arrangement in nature is at best, a haphazard one, and so must it be when they are used in the garden. Such boulders

appear perhaps at their best set on the side of an undulating bank, strewn to the bottom and beyond, or filling, in ordered chaos, a winding valley, with stream or twisting pathway at their feet.

The rocks of a stratified outcrop require a wholly different treatment. A stratified deposit is seen in nature only after its protective covering of soil or debris has been removed by erosion. The soil covering is an essential part of the rock formation. From this covering at some point the strata emerge and into it again they must recede. In the garden, a stratified formation may project from a bank or an artificial mass of soil as if uncovered by erosion. Following some natural example, this stratified deposit may appear as the high point and the core of a knoll or hillock, or again, as an exposed ledge, heightened and eroded by a meandering stream. The rock mass may not necessarily be extensive; a single out-crop of but three or four stones, placed correctly, and with suitable foreground and backing, may in itself make a beautiful picture. Rocks should not be over-crowded. A single, strong rock mass, dominating the approach of a rising stretch of well-trimmed turf or alpine planting and tied to this approach by a few scattered stones correctly placed, may result in a more simple, more striking, and more satisfying picture than could ever be obtained by scattering four times the amount of rock in a thoughtless, jumbled pile.



FIGURE 7. A LIMESTONE OUTCROP

Vertical jointing can be observed between the higher rocks on the right. The whole or any part of this outcrop could form the nucleus of a rock garden

Many forms of outcrop can be successfully introduced on an entirely level site. The outcrop can be of the valley type in the form of a ravine, perhaps very small with six large stones on one side and two or three on the other, or perhaps large enough that a pathway may wind through it. This treatment can be readily applied to the double banks of a stream. The edge of a pond invites the inclusion of a few rocks to suggest the presence of a deeper hidden mass which has been partly exposed and broken down by the action of water. For this purpose a few rocks only, placed within and around one part of the pond, may be all that is needed.

A frequent mistake is to entirely surround a naturalistic pond with stones, flat or evenly irregular like the teeth of some prehistoric monster. A continuous stone border, however naturalistic it is intended to be, should seldom if ever be used around a pond or pool of other than formal design.

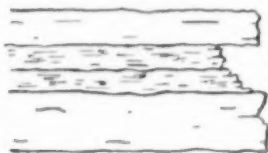


FIGURE 8. DIFFERENTIAL WEATHERING OF STRATA

Crumbling shale may be sandwiched between layers of more durable sandstone. This is common around Ithaca.

The use of limestone or sandstone involves a definite set of natural restrictions. Unless the laws of stratification and jointing are recognized and reasonably conformed to, the results can never be entirely realistic. The more important rules are briefly these: in a natural outcrop the lines of stratification are traceable

and continuous throughout the entire formation; joints are also continuous; all stones making up a single stratum are likely to be consistently weathered; one stratum may be of weaker rock than another, such weak rocks will have crumbled and receded back beyond the lines of the stronger, causing the latter to overhang; stratification in the body of an outcrop is more definite than at the edge; the longer exposed rocks have had their sharper edges removed and have been reduced in size by weathering; not infrequently they have tumbled forward or sidewise from their natural level and inclination. In the garden, it does not matter at what angle the strata are inclined so long as this angle is consistently maintained throughout. A gentle backward tilt from the front surface to the soil cover behind has the advantage of conducting rainfall back into the soil mass where it will be available to the plants.



FIGURE 9. ROCKS CHANGE POSITION  
In well-weathered rock, stratum lines may be obscured as a result of rock displacement

## View

Since the site dictates the general form of the rock assemblage, no progress can be made until the most suitable position for the rock garden has been selected. The next step is to decide from which directions the garden is most likely to be seen. It is possible, with the use of stakes, to establish lines of view and to indicate possible "dying out" points of the rock strata directly on the ground, but it is often preferable to condense and clarify one's ideas by first planning the garden on paper. If the main view and tentative boundary lines are sketched approximately to scale on paper, it should not be difficult to develop a rough plan of some stratified formation that would be simple and interesting as well as adapted to the site.

An outcrop consists usually of a series of rock strata which emerge from solid ground at some point, incline upwards for a distance, and then end more or less abruptly. This is the maximum rock exposure, where the rocks are no longer protected by soil and consequently form a steep, weathered face. If the rock garden is to represent an outcrop upon a level site, the sharper, broken rock face, which usually is the most interesting side, should be turned towards the main-view axis; that is, towards the front boundary.

If the rock garden must at times be viewed from all sides, the rear of the outcrop must have a natural appearance. The strata must, therefore, be inclined backwards at such an angle that they disappear satisfactorily into the level ground within a reasonable distance and within the confines of the site. If this distance is short, the stratum dip must necessarily be abrupt. If only one side of the garden will be seen, however, it may be possible to continue the strata for but a short distance backwards. This abrupt and artificial inclination can be obscured by a screening of shrubs. This method can be used most easily on a corner or boundary site, but it is artificial and must be used carefully. The rocks should appear to sink naturally into a soil cover even if they do not in actual fact.

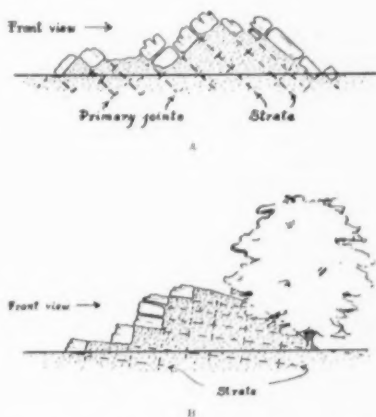


FIGURE 10. ROCK OUTCROPS ON A LEVEL SITE

A. Strata steeply inclined. The outcrop may be viewed from all sides.

B. Strata gently inclined. This is best as a bank outcrop but occasionally may be used on a level site if the false rock return can be screened effectively.

The line of view, the position of the foremost rocks, and the points of rock disappearance must be the first items to indicate upon the scale plan. With this start it will not be difficult to fill in the details. The position of the high points will be determined. It might be well to sketch the more important features and aspects; to indicate whether the main face will descend abruptly in one drop or in a series of small irregular terraces, whatever may seem the more effective; if a stream is to be used, to indicate its most logical course as suggested by the general topography and surroundings and the rock formation; if a path is required, to determine the contour that it would naturally follow. Not until all of these preliminaries have been plotted should actual construction be commenced. It is possible, or even probable, that during construction, every detail of the plan will not be adhered to, but the essentials will be followed. The shape of a single rock may suggest some new idea or alteration. If the new development ties in with the original scheme, well and good; if it does not, it should be discarded. The final plan should be simple and clear, and not merely the jumbled product of a series of conflicting aspirations. It cannot be over-emphasized that the keynote of design should be simplicity; simplicity of thought in planning and simplicity of structure in completion. The fewer the principal focal points, especially in the small garden, the more coherent will be the effect.

### **Foreground**

Much of the effectiveness of design depends upon the character of the immediate foreground. There is no foreground which sets off a limestone formation to so good advantage as that of a rolling stretch of closely trimmed turf. Grass, after all, is the setting of the field, and yet the advisability of having turf in such close proximity to the rock garden is sometimes questioned. This is a problem for the individual to decide. Planting space must always be left upon the more level stretches and upon and between the rocks themselves. If turf can be brought up to these planting areas, and occasionally to and around the rocks, and further, if the turf can be maintained in good condition, it is doubtful whether any other setting can be more pleasing in appearance. Grass is somewhat difficult to trim close to the rocks. If an alternative must be found, some low-growing ground cover is the most suitable. It is usually inadvisable to plant all sides of the rock garden too closely with shrubs, and less advisable still to force it to rise abruptly from an all-enveloping field of paving stone or gravel.

## Background

As the prime function of the foreground is to lead the eye easily and smoothly into the direction of the principal feature, the rocks, so the function of the background is to enable the eye to rest there comfortably by the simple means of obliterating all other objects of a distracting nature. If no such subjects exist, no background may be necessary, but that situation is rare, even in an ideal site where the view beyond does not encourage the eye to stray from the object upon which it should supposedly rest. Upon most small properties a suitable screen background is needed. Trees or shrubs chosen for this purpose, whether evergreen or deciduous, should be essentially neutral in texture and foliage. If in themselves they are conspicuous, they will defeat the purpose for which they are used. The careful planning of the foreground and background is almost as vital a part of the finished composition as is the design of the garden itself.



FIGURE 11. AN OPEN FOREGROUND IN THE NEW YORK BOTANICAL GARDENS

Whether on a large or small scale, unoccupied space between masses provide contrast and at the same time imparts a sense of restfulness to the rock picture





FIGURE 12. A SITE WHERE BACKGROUND BECOMES ALL IMPORTANT

### CONSTRUCTION

All materials should be on hand before work is started.

In nature, rocks are anything but uniform in size, and in the garden at least some fairly sizeable ones should be used; some averaging a foot or somewhat more in length. A few large ones, up to 2 by 3 feet, depending upon handling facilities are valuable for the main features. Smaller ones are needed for the more restricted places. A collection of chips and "cannon balls," none of which are more than 6 inches in diameter, can seldom present more than a weak appearance.

If the soil of the site is good, much of it will be usable during the course of construction. The probabilities are, however, that much fresh soil will be required, particularly if the garden is to be of a built-up character on a level site.

### Drainage

Good drainage is necessary for practically all kinds of rock plants. If the soil upon the site chosen cannot readily take care of normal water run-off and absorption, a few yards of agricultural tile and some crushed stones or coarse cinders, to be properly inserted well below the level of construction will be needed. Construction should never be started in a place that is inclined to be permanently wet. If drainage is satisfactory at



the start, it is a relatively simple matter to regulate subsequently the water-holding capacity of the soil to suit the needs of all, or particular, plants. This can be done either through the addition to the soil of moisture-retaining organic matter or by some method of artificial irrigation.

### Construction methods

Construction methods vary to some extent with the kind of feature to be reproduced, but more particularly with the type of rock which is being handled, for it should be clear by now that the placement of stratified rocks necessitates a different procedure than does that of the unstratified kinds.

#### With stratified rock

If a satisfactory plan has already been made, the next step is to indicate the position of the main rock feature on the site by means of stakes. In correct relation to this, additional stakes should be used to indicate "dying out," or terminal points of the principal and subsidiary strata. Thus relationships will be visualized and balanced. Upon this ground plan an approximate semblance, though reduced in size, of the final mass outline can be modeled in soil. Any loam soil of good texture and drainage will be suitable for this ground work. This done, it is good policy to commence immediately with the important feature. Some particular large rock may show promise of becoming the dominant part of the spur or bluff. It may be tried in a number of positions, and gives an elevation from which to work. In certain situations this one rock may strike the keynote of the whole



FIGURE 13. USE OF VERTICAL STRATA IN A LIMESTONE GARDEN

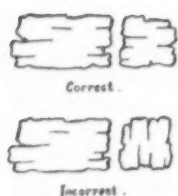


FIGURE 14. CORRECT  
AND INCORRECT  
ALIGNMENT OF  
ROCKS

Graining of adjacent  
rocks should be in  
alignment.

composition, in which case all else will be subservient to it, but in harmony. It may be well to complete the central group and work outwards from it. This group will establish the general scheme of stratification and jointing. The remaining rocks will serve the immediate purpose of continuing the established strata to earth in the same general direction, though not always in continuously straight lines. The sense of line must certainly be there, but frequently individual rocks will be missing or will have fallen forward from their original positions. The line can be picked up a distance off by a single stone, well weathered.

The ability to create a composition which can be recognized as geologically correct, but which is nevertheless free from the monotony of a slavish and even false emphasis upon continuous line, is an art to be perfected only by practice and by intelligent study of natural rock formations.

Most rocks should be placed to expose their more attractive and weathered surfaces. Small stone chips will be useful in wedging them into position or for preserving space for subsequent planting. Good soil must be tamped and packed around the rocks to set them firmly and securely. This is important, for any subsequent settling may throw out the alignments and effectually ruin the whole composition.

### With unstratified rock

Construction of a garden of glacial rock differs only in the scheme of rock placement. The exposed outcrop may be on open ground as just described, or on the side of a bank, or in the form of a depression or valley. The garden outline will be staked as before, but the rock arrangement will necessarily be more haphazard. Glacial rock was deposited in no set order. Sometimes isolated groups tend to be somewhat strung out in the direction of movement of the ice, but that is all. At least it is preferable to adhere to a scattered group formation. One or two groups of stone can take the place of the main feature of the stratified outcrop. They will need a few of the larger rocks for strength. If on a bank, they will form a steeper mass than the adjacent stretch of open soil, and will sustain a larger shoulder of earth behind them. Small intervening groups, with occasional isolated rocks here and there will tie the composition into a completed whole. Such a group formation is more convincing than a piece of ground merely dotted with similarly-sized rocks.

Glacial rocks are often hard and extremely slow in decomposing so

when collected they are likely to be weathered on one side only. When these are placed in position, they will appear more natural if only the darker, weathered side is exposed, and here they should be buried more or less to their original depth.

A granitic formation is usually surrounded by fallen chips and blocks which have been split from it by the action of frost. This picture is the most satisfactory one from the garden standpoint. Whether it is modelled upon a level site or worked into a natural bank, the essentials are the same. The background or core should depict bed rock. The fissures between individual rocks may be subsequently plant-covered so that the mass may appear solid. Surrounding this mass, on its side in talus slope of coarse broken chips or at its base in scattered groups of larger sharp-edged rocks, what represents the loosened blocks and fragments split off by weathering are placed in studied informality. With the exercise of ingenuity a very convincing picture can be created. All stonework will have been set in well-prepared soil as described and the many fissures and interspaces between rocks will provide abundant planting areas. The illusion of solidity in the dominant rock mass of the supporting outcrop can be further strengthened by restricting the cover planting of this area to low and less luxuriantly growing plants. In nature, the cracks and hollows in solid granite would



FIGURE 15. AN INEXPENSIVE FARM ROCK GARDEN

The good arrangement of glacial rock could be made increasingly effective by elimination of the straight\* line boundaries and by planting a suitable background

provide but meager fare for what small plants might seek a foothold in them. The rock-fragment talus slope, which is in keeping with this as with most other outcrop formations, serves as an ideal home for many of the choicer alpinists. Such a planting should be underlain with a deep porous soil. With but slightly more elaboration and the provision of underground water, it could be constructed as a moraine, which is one of the most useful plant-growing devices that the rock gardener can own.

### The moraine

The moraine of nature is particularly associated with glaciers. The term properly applies to the deposit of rock fragments and detritus which is laid down by a glacier as it slowly melts and recedes. The name has been made to refer loosely, however, to many forms of rock and gravel accumulations of considerable depth and of good drainage. It is similar in many respects to the talus slope, although the accumulation of rock fragments is a product of the weathering of larger rock formations. In certain situations, particularly in the true glacial moraine, this deep, well-drained deposit is maintained in a moist condition by the continual seeping of water through its lower levels from the melting ice and snows of the higher mountainside. Its cool airy depth is a favorite haunt for the



FIGURE 16. GARDEN MORAINE—AN IDEAL HOME FOR MANY PLANTS OF SMALL STATURE

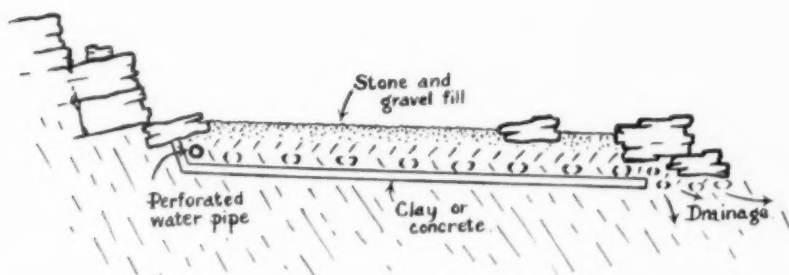


FIGURE 17. CONSTRUCTION DETAILS OF THE MORAINÉ

roots of alpine plants. The garden moraine is an adaptation of this. It is a particularly useful device for successfully growing a variety of plants which have a liking for a deep, moist, and well-drained root run.

In New York's rather dry climate the moraine is best constructed on a gentle slope with provision made for a small flow of underground water from a faucet or perforated pipe during the dry periods of summer. The procedure is to excavate the ground to a depth of 18 inches or more. If the sub-soil is well drained, a layer of clay or concrete will be necessary to retain the water. This base is covered with coarsely broken stones, with those of finer texture nearest the surface. A small amount of fibrous peat is sometimes inter-mixed near the surface. Water is introduced at the upper end and allowed to seep down through the lower layers of stone. It is surprising with what luxuriance a great variety of alpine plants flourish on such a seemingly barren site as this, particularly such plants as gentians, androsace, drabas, and many primulus. Ideal drainage in winter and adequate moisture in summer are the chief requirements for good results. A small moraine, covered with gravel or stone chips, harmonizes well with any kind of stone work and makes the finest foil for the small bluff or higher rock deposit.

### Pathways

Practically any garden, unless extremely small, will need some convenient approach to its interior parts. Trails through the larger rock garden are designed to link a series of the most interesting views and pictures which the garden has to offer. For the most part, they will follow the more gradual contours of the slopes, ascending by flights of steps only when some higher spurs must of necessity be crossed. It is essential to remember that all trails and steps are a part of the garden itself. In a garden which is intentionally naturalistic the path should be clearly indicated but should

not be so conspicuous as to draw attention from the flowers or rocks which are far more important. Too frequently, one sees a beautiful garden marred in appearance by pathways which inadvertently monopolize the entire scene. The following faults are most common: building trails too wide; having them paved with stones conspicuously out of character with the rocks of the garden; and, which is worse than either of these, setting such paving in a formal manner with straight or regular edges. It is agreed that any trails must be wide enough to accommodate normal traffic, and the importance of each will directly govern its width; but, if the path serves only for the inspection of the rock garden and is not a through way to other parts of the property, it should not be wide. A few stepping stones will serve for most of the smaller trails; paving of a not too regular kind for the remainder. If the foreground entails the use of turf, specially designed pathways may not be needed. Since any paving must be made of stratified rock, it may be more in keeping to use gravel for surfacing the more-frequented walks in a garden of the glacial-moraine type. A few rounded stones dotted here and there along the margins of its course will serve to break any monotony of line.



FIGURE 18. A STUDY IN CONTRAST—CONFLICT OF THE FORMAL AND THE NATURAL.

A winding gravel pathway would be more in keeping with this good arrangement of glacial boulders than the present straight-line paving with stratified rock.

The same principles of informality apply in the construction of steps. Let them be by all means solid and easily negotiable, but never so regular or conspicuously artificial as to interrupt too forcefully the natural lines of the development. In both paving and steps, allowance must be made at the time of construction for subsequent planting.

### THE FORMAL ROCK GARDEN

THE FORMAL rock garden, as such, is of more recent development than the naturalistic. True, there have been walls and steps and paving in our gardens for many generations but their value for more than utilitarian purposes has seldom been fully appreciated. The paved circle which surrounds the small statue or sundial is usually somewhat off the path of ordinary traffic. How much more interesting if enlivened with creeping rock plants than if left quite bare or for only the weeds to embellish! The environs of a small city property, the approach, and the "living areas" to practically any residence afford many opportunities for the use of plants in some such formal development.



FIGURE 19. A ROCK WALL.

An exquisite setting for a wide variety of low plants



## THE ROCK WALL

Grass banks are difficult to maintain in good condition. A rock wall eliminates mowing and presents an interesting appearance at all times of the year. Correctly constructed it will be permanent and will support a large and varied cover of alpine plants.

Construction must be solid. Fairly large rocks are to be preferred, with at least one good square side. Foundations should be excavated to a depth of at least a foot. If they are set in concrete, so much the better. If the face of the wall is inclined towards the bank at an angle of some 10 or 15 degrees from the perpendicular, a better supply of rain water will be obtained for the deeply rooting plants. Before construction commences,



FIGURE 20. CONSTRUCTION DETAILS OF A ROCK WALL.

The wall is more solid if its foundations are set in concrete rather than in earth

plenty of rocks should be on hand, together with a pile of good loamy soil and at least some of the plants. The soil should be of a light, well-drained type and may be enriched with a little leaf mold or peat or some well-rotted manure. Plants are far easier to set at the time of construction than they will be later on. The rocks are placed evenly and in courses, as they would be for a regular masonry wall, using soil in place of cement to bind them. The plants are inserted at intervals as construction proceeds, their roots being carried well back and embedded in good soil. Blocking the stones apart with small pebbles gives additional pockets for later planting. To facilitate water absorption, the rule of sloping the top surface of the rocks into the bank should be observed. A top

coping of paving stone is optional. When used, it does impart a pleasing additional touch of formality which may be desirable or not according to circumstances.

## FORMAL PAVING AND STEPS

Flagstone paving of straight line or "crazy" design can be particularly beautiful as a home of many kinds of rock plants. For the sake of permanence, in an extensive paved area, it is again essential that good drainage be provided. Cinders, perhaps underlaid with tile, are commonly used as a base, the stones being set upon a top layer of sand. At intervals, plant pockets are inserted between the stones by excavating a hole in the cinders



and filling it with prepared soil. These pockets can be planted immediately or marked with a label to insure that their positions are not lost.

Few garden features can be more beautiful than a well-designed flight of steps tastefully plant embellished. The garden steps exist as a lure to the visitor to discover what lies beyond them, and yet, with a little effort, a flight of steps can easily be transformed from a mere transition element into a feature, and in most places there seems to be no logical reason why this should not be attempted. With this in view it should be emphasized that good design and permanence are essential. All steps should be set in concrete, but the concrete

need not be continuous. Irregularly spaced holes can be formed at intervals, to lead to soil pockets beneath. In these the plants are placed. There is no reason whatever why beauty and service cannot go together.



FIGURE 21. A PLANTED PATHWAY

Plants used for this purpose must be low in stature

## THE USE OF WATER

**W**ATER in a rock garden adds a touch of charm and interest that cannot be obtained by any other device. A quiet pool that mirrors the beauty of a miniature sculptured cliff has an irresistible appeal however small the pool may be; and any stream or tiny splashing waterfall has a fascination. The small amount of water needed may not cost much, but a water feature can be very costly in appearance, if not in money, if incorrectly designed and made. The pond or stream must fit the scheme in an entirely natural way. A waterfall must appear, not like a flight of steps, but as if nature had made it; a pool, not like a concrete bath tub, but rather giving the impression of a stony, water-filled hollow, bordered with scattered rocks and sod and water plants. The pool may be made of concrete, but the fact should not be obvious. The rocks on the margin should belong to the pool, consequently some should be within it, perhaps even sunken into the concrete where the water may lap around and welcome

them as a part of the picture and not merely as an after addition to it. Naturalistic design should be forever the underlying keynote.

Just as a stream will not naturally appear from nowhere at the highest point of a rocky eminence, so will a pool be out of place on a hillside, if there is nothing more than a bank of soil to keep it in position; long ago the water would have cut through the soil to flow downwards and collect only in the lowest natural depression. If a stream turns, then there must be some reason for its turning, a rock ledge or a fallen boulder; if it cascades over an isolated rock, it does so only because it cannot get around that rock by cutting through softer material; an earth embankment to such a waterfall would be unnatural and wrong. Principles such as these may, on the surface, seem unimportant, but neglect them, and the attempt at the use of water will be sadly unconvincing.

## PLANTING

DISCUSSION up to this point has dealt almost exclusively with the problems of rock and rock arrangement. From what has been said it may seem in the eyes of some that a rock garden must necessarily be a magnificent and naturalistic rock display with plants but a secondary feature. If such an impression exists, it has been created unintentionally. A rock garden should be beautiful in itself, but it exists at the same time as a suitable and worthy place in which to grow those many exquisite small plants which, in the herbaceous border or in any other part of the garden, would be out of place or lost. Therefore, something must be learned of the natural habitats, preferences, and peculiarities of rock-garden plants before one can even aspire to cultivate them successfully. In gaining information from other gardeners, from books, or, better still, from excursions into the fields and hills, it will be noted that the plants of the garden are drawn from a great many different regions and environments. In becoming acquainted with any particular plant it is the knowledge of the special ecological conditions to which the plant is accustomed that will be of the utmost value in practicing its cultivation. Is the real home of the specific plant a rocky moraine, high on some distant mountain side or is it rather along the sodden grassy margin of a glacial stream? Is it a plant of the higher open peat lands, or of limestone cliffs, or of the fields and woods of one's own vicinity? Success in handling plants is invariably based not upon rule-of-thumb methods but upon a studied understanding of their individual requirements.

## SOIL

Aside from those plants which require special nutrients and acidity, many like an open, cool, deep, and well-drained soil. Perhaps this is to be

expected when consideration is given to the cool mountain climates and general conditions under which many of the rock plants and all of the true alpinists naturally grow.

Excessively heavy soils are to be avoided at all costs. It is better to replace clay soil than to attempt to make it over, for no amount of sand or peat moss can be added to make the clay entirely satisfactory; it will pack too tightly, will become hard and solid in summer and a wet, sticky mass in winter. A light loam topsoil ordinarily does not cost much. This could stand some additional sand and possibly a small proportion of stone chip-pings. Deep soil, good drainage, and constant moisture together provide the key to the successful cultivation of all alpinists and most rock-garden plants.

Those who have studied alpinists in their native haunts may have the impression that these plants prefer a rather poor soil. But, in the garden, this is not true. To be sure, in too rich soil, some of the ranker growers may tend to become a nuisance, but most can be afforded at least a plentiful admixture of decaying vegetable matter, and some can even use manure. A few will exhibit preferences for either extreme of soil fertility and moisture content. *Anemone pulsatilla* likes nothing better than the barest of barren slopes, and, though in a rock garden, it is usual to think of plants of cool mountain regions, it soon becomes evident that the present-day garden is by no means confined to such. It is not uncommon to see a true alpine, such as androsace, growing side by side with perhaps opuntia, a native cactus, and it is easy to realize what different conditions two such plants require. The endeavor to suit all plants, and to do it within a strictly limited area, is one of the most serious problems of soil preparation.

Most plants will do well in a loam, sand, and leaf-mold mixture; but rhododendrons, of which several small species are well adapted to rock-gardens, Scotch heather, and a number of other plants, both shrubs and perennials, must be considered. These have their homes upon the shallow, organic deposits, overlying the water-washed, granite boulders of the mountains. They will have to be grown in an acid, peaty soil. Still others, thriving naturally on limestone formations, and of which *Aster alpinus*, many of the saxifrages, the rock roses, and edelweiss are examples, require a soil containing a certain amount of lime. In order, then, to grow a wide representation of rock plants, it may be necessary to provide a variation of soil types, rather than just the one: a main body of well-drained loamy mixture, a portion containing acid soil, and another section with definitely alkaline soil. In a fairly large garden, sections can be built to contain these particular types, but in a small one it may be more practical merely to clean out a number of plant pockets and to refill them with the soil suited to

the plants which require this special treatment. Such pockets should be well packed around with stone so that water will not wash the soil from one part to another and render the additional work useless. An acid condition can best be obtained by the use of plenty of peat moss, and an alkaline by admixing lime or limestone chips.

### SETTING THE PLANTS

The principal care in planting is to be sure that the roots are set firmly and deeply in good soil. Part of the planting should be done at the time of construction, especially in wall gardens and those particular places where it has been necessary to place a number of rocks one upon the other. The general procedure of construction of this kind is the following: Basal rocks must be set firmly. It is well to stand on them to see that they do not move. They are then covered with a layer of good growing soil, upon which the plant is placed in position, with its roots spread over the surface so that they may easily extend to the supporting soil mass behind. The roots are covered with another layer of soil, which is thoroughly firmed in all the corners with the aid of a pointed stick. This done, the next stone is placed above, making sure that the front surface is set back slightly so that the plant may get the benefit of rain.

As a general rule, it is most satisfactory to plant as much as possible during construction. This is better than waiting until the whole is completed and then attempting to force the tender roots into crevices which at this time seem too small to contain them. Such crevices at best are extremely hard to excavate and refill in such a way that the soil is actually packed solidly. It will be evident, however, that much planting, particularly in the nature of subsequent filling and replacement, will have to be done after construction has been completed. The best time to do this is in the spring, when all danger of frost heaving will be past and when the plants will be in condition to make a rapid start. Plants should always be set firmly and at the same depths as that at which they originally grew. Too deep planting may be followed by crown rot, and too shallow by retarded growth as a result of drying out.

### PLANTING ARRANGEMENT

It is important to place individual plants where they will show to best advantage. The "put it anywhere" type of planting should never be followed. Certain placements have definite advantages over others in respect to the development of the individual plant, and particularly to the appearance of the completed whole. Since correct color combinations naturally increase the effectiveness of arrangement, one must become familiar with

the plants and their colors. The more fundamental problem, however, is the placement in consideration of habit and, in the solution of this problem, catalog descriptions of habits and rates of growth are of great assistance.

The two major groups of rock plants are: (1) those whose chief effect is derived from massing, and (2) those grown for their intrinsic beauty, but which are incapable of providing bold dashes of color. In the first group are such plants as arabis, aubrietia, the spreading phlox, some of the low campanulas, and many others; in the second, the true delights of the specialist, which might be illustrated by *Ramondia pyrenaica*, the encrusted saxifrages, Lewisias, or the rarer primulas.

A suggested planting plan would be: for clustering over the rocks bordering the pathways, the commoner massing types, *Phlox subulata*, arabis, *Hypericum repens*, and the smaller spreading dianthus. Similar types can be scattered on top of the rocks farther back, together with some of the other spreaders, the mossy saxifrages in a sunny place, and some of the campanulas. Where it is moist, the gentians could be tried. The immediate aim is a foundation of the more rapidly-growing dwarf spreaders. On the level spots, to avoid a too flat appearance, these drifts can be interspersed with



FIGURE 22. WHERE ROCK AND WATER MEET  
An ideal situation for the tiny *Primula julianae*

plants of slightly taller habit. It is in the corners, removed a little from these broader sweeps, and where no other coarser color masses can detract from their beauty, that the real "gems" are given their place.

On steps and pavements the selection of plants is necessarily restricted to permanently dwarf types. A few higher ones on the sides or in the corners are effective but in the line of traffic anything above an inch or so would have its obvious objections. For this specialized purpose, while many others could be chosen, such plants as *Arenaria verna*, *Cotula squalida*, *Dianthus alpinus*, *Phlox subulata*, *Sagina procumbens*, *Sedum acre*, *Sedum gracile*, and forms of the dwarf thymes and veronicas are particularly recommended.

The principle of massing for color effect is of great importance and it cannot be overemphasized. In planting a spreader, not one but a whole group are used. The groups should vary sufficiently in outline and space to prevent monotony. A number of bulbous plants can be used exceptionally well: the smaller types of Narcissus, *N. bulbocodium* and *N. cyclamineus*, the grape hyacinth, scillas, the dwarf tulips, and, for interest in the fall of the year, the true autumn crocus. It is well to plant these bulbs among the spreading masses of such plants as thymes and phloxes; they will come up and flower through these other plants, the leaves will die down and there will be no bare spaces left for the remainder of the year.

While the majority of the plants in the rock garden are perennials or bulbs, many low annuals may be used to provide color during the summer and all months. In all planting, however, the effect of the plant or plant mass upon the appearance of the finished garden must always be kept in mind. In the representation of a mountain scene, a positive dark and upright plant would be out of place upon an open hilltop. Low spreaders of light texture and light color would be more effective in suggesting the haziness of height and distance. The plant of bold, positive outline would serve better as an accent, calling attention to some important feature or, suitably placed beside or below some higher object, and because its size is an unmistakable quantity, it could be used to emphasize the height of a bluff or cliff. Without a doubt the dwarf shrubs are of greatest value for permanent effects of this kind. In rock and shrub together is the bold outline of the rock scene molded. It is the function of the smaller plants to provide the decoration and the dress. It should be remembered always, however, that this dress completes the garden picture through its ability to strengthen and accentuate design and not through its possible effectiveness as a smothering and obliterating blanket.



FIGURE 23. *CAMPANULA CARPATICA*

This is an old favorite but one which is lastingly showy and satisfactory



FIGURE 24. A HILL-TOP PLANTING ON A STONY OUTCROP IN THE CORNELL ROCK GARDEN

In spite of the proximity of an artificial background, the low plant masses give an effect of height and distance



## PLANTS FOR THE ROCK GARDEN

### ANNUALS

Scientific name	Common name	Color	Remarks
<i>Dimorphotheca sinulata</i>	Cape marigold	Orange, white	Dry, sun
<i>Gypsophila muralis</i>	Wall gypsophila	White, pink	Tiny flowers
<i>Lobelia erinus</i>	Lobelia	Blue	Tolerates shade
<i>Lobularia maritima</i>	Sweet alyssum	White, purple	Any situation
<i>Nierembergia hippomanica</i> ( <i>caerulea</i> )	Cup flower	Purple	Any situation
<i>Portulaca grandiflora</i>	Portulaca	Various	Dry, sun
<i>Sanvitalia procumbens</i>	Creeping zinnia	Yellow	Flowers late summer
<i>Verbena hybrida</i> ( <i>hortensis</i> )	Verbena	Various	Any situation

### BULBS

Scientific name	Common name	Color	Season
<i>Allium moly</i>	Allium	Yellow	May
<i>Chionodoxa</i> sp.	Glory of the snow	Blue, pink	April
<i>Colchicum autumnale</i>	Autumn crocus	Lavender	September
<i>Crocus</i> sp.	Crocus	Various	April
<i>Eranthis hyemalis</i>	Winter aconite	Yellow	March
<i>Erythronium</i> sp.	Trout lily	Yellow	May
* <i>Fritillaria meleagris</i>	Checker lily	Various	May
<i>Galanthus</i> sp.	Snowdrop	White	March
<i>Leucojum aestivum</i>	Snowflake	White	May
<i>Lilium pumilum</i>	Coral lily	Red	June, July
<i>Muscari botryoides</i>	Grape hyacinth	Blue, white	May
* <i>Narcissus bulbocodium</i>	Narcissus	Yellow	Late April
* <i>Narcissus cyclamineus</i>	Narcissus	Yellow	Late April
<i>Ornithogalum umbellatum</i>	Star of Bethlehem	White	Late May
<i>Scilla sibirica</i>	Siberian squill	Blue, white	April
<i>Scilla hispanica</i>	Spanish squill	Blue, pink, white	May
* <i>Tulipa</i> sp.	Botanical tulips	Various	May

\* Indicates perfect drainage necessary.

### COMMON PERENNIALS EASILY GROWN

- Achillea tomentosa*; wooly yarrow; 2 to 6 inches high; spreading; yellow flowers in May to October
- Apuga reptans*; bugleweed; spreading; blue flowers in May to June; best in half shade
- Alyssum montanum*; yellowtuft; 10 to 12 inches high; yellow flowers in June and continuing to lesser extent through the summer
- Alyssum saxatile*; goldentuft; 8 to 12 inches high; yellow flowers in May; forms bushy clumps
- Aquilegia canadensis*; wild columbine; 10 to 24 inches high; native; red flowers in May and June; tolerates light shade and moist situation
- Arabis caucasica* (*A. alba*, *A. alpina*) var. *flore-pleno*; Alpine rockcress; 6 to 8 inches high; spreading clumps; double white flowers in April and early May
- Arenaria verna*; 1 to 2 inches high, spreading; foliage grass like; minute white flowers, tolerates light shade; valued as ground cover; particularly in flagstone walks or on terraces
- Armeria maritima*; sea pink, thrift; 3 to 8 inches high; forms clumps; pink flowers in May and scattered until frost
- Asarum canadense*; wild ginger; 6 to 10 inches high; for light to deep shade; forms ground cover



- Asarum europaeum*; European ginger; similar to wild ginger but has glossy leaves; difficult to get established
- Aster hybrids*; dwarf hybrids of *A. Novi-belgii* and *dumosus* types; 8 to 12 inches high; white, pink, or lavender flowers; cushion effect in September and October
- Aubrieta deltoidea*; false rock cress; 3 to 5 inches high; spreading; lavender or rose-purple flowers in April and May
- Bellis perennis*; English daisy; 5 inches high; white or pink flowers in May and June; var. *monstrosa* is an improved form with large double flowers
- Bergenia cordifolia* (*Saxifraga cordifolia*); 10 to 12 inches high; rosy-pink flowers in May and June; foliage large and coarse; tolerates half shade; must have moist location
- Brunnera macrophylla* (*Anchusa myosotidiflora*); Siberian bugloss; 10 to 16 inches high; blue flowers in April and May; does well in half or deep shade
- Campanula carpatica*; Carpathian harebell; 6 to 12 inches high; spreading clumps; blue or white flowers from June to frost; best in moist soil and good drainage; tolerates half shade
- Campanula poscharskyana*; 6 to 8 inches high; spreading clumps; blue flowers in June; can be used as groundcover
- Ceratostigma plumbaginoides* (*Plumbago larpentae*); blue leadwort; 8 inches high; blue flowers in August and September; spreading; tolerates shade
- Cerastium tomentosum*; snow-in-summer; 5 to 6 inches high; gray foliage; white flowers in June; does well in poor, dry soil
- Cymbalaria muralis*; 2 to 4 inches high; creeping; fast grower; small lilac, blue, or white flowers all season; good plant for poor soil and to cover rock ledges; best in half shade
- Dianthus deltoides*; maiden pink; 3 to 8 inches high; pink, red, or white flowers in May through July
- Dianthus gratianopolitanus* (*D. caesius*), Cheddar pink; 6 to 12 inches high; pink flowers in May through July; several other low-growing perennial species of *Dianthus* are good in the rock garden; all *Dianthus* are best in well-drained, neutral, or slightly alkaline soil
- Dicentra cucullaria*; Dutchman's britches; 10 inches high, fine-textured foliage; white flowers in May; best in half shade
- Dicentra eximia*; wild bleedingheart; 12 to 24 inches high; light pink flowers from May through July; best in half shade
- Dodecatheon meadia*; shooting star; 5 to 12 inches high; pink or white flowers in May and June
- Geranium sanguineum*; scarlet cranesbill; 6 to 8 inches high; red-purple flowers in May and June, then scattered until frost; spreads rapidly
- Gypsophylia repens*; creeping baby's breath; 4 to 8 inches high; white or pink flowers; late May through mid July
- Helianthemum nummularium*, var. *grandiflorum*; sun rose; 4 to 8 inches high; yellow and pink flowers in June and July; does well in full sun in dry location
- Hepatica americana*; liverleaf; 8 inches high; violet, pink, or lavender flowers in April and early May
- Heuchera sanguinea*; coral bells; 12 inches high; red flowers from June to September; tolerates shade
- Houstonia carulea*; bluets; 2 to 3 inches high; native in meadows; blue flowers in May and June
- Iberis sempervirens*; evergreen candytuft; 6 to 10 inches high; evergreen foliage through the winter; white flowers in May
- Iris cristata*; crested iris; 4 to 8 inches high; blue or white flowers in May
- Iris pumila*; dwarf iris; 10 inches high; purple, blue, yellow or white flowers in May
- Lavandula officinalis* var. *compacta*; lavender; 12 to 15 inches high; gray aromatic foliage; lavender flowers in June through August
- Mertensia virginica*; bluebells; 10 to 15 inches high; blue flowers (pink in bud) in June; best in half shade in moist situation; foliage disappears in summer
- Mitella diphylla*; bishops cap; 8 to 12 inches high; native; white flowers in May; best in half shade
- Myosotis alpestris* (or *sylvatica*); forget-me-not; 3 to 5 inches high; blue white, or pink flowers in May and June; tolerates light shade
- Myosotis scorpioides*; everblooming forget-me-not; 5 to 8 inches high; blue or pink flowers from June throughout season; best in moist location

- Phlox subulata*; moss pink; 3 to 6 inches high; forms creeping mats; pink, red, blue, purple, or white flowers in May
- Primula* species; primroses, Primulas; do best in a cool moist soil and in half or deep shade; many species and varieties; most flower from late April through May; *P. japonica* flowers in June, and is followed by *P. bulleyana* and *P. beesiana*; easily-grown species include *P. denticulata*, *P. vulgaris*, *P. elatior*, *P. sieboldii*, *P. polyantha*, *P. japonica*, *P. juliae*, and others
- Pulmonaria saccharata*; lungwort; 5 to 10 inches high; grow in shade; blue flowers in late April and May
- Ranunculus repens* var. *florae-pleno*; creeping buttercup; 10 to 12 inches high; spreads rapidly; may become weedy; yellow flowers in June
- Rosa chinensis* var. *minima* (*R. roletti*); miniature rose bushes; 8 to 12 inches high; flowers small, pink, or white in May to October
- Sanguinaria canadensis*; bloodroot; 8 to 12 inches high; half to deep shade white flowers in April. Double flowered variety is superior
- Saponaria ocymoides*; soapwort; 4 to 6 inches high; creeping; pink flowers in May through July; good for poor soil in dry sunny location
- Saxifraga* species; saxifrage; *Saxifraga sarmentosa* one of the easiest to grow; 4 to 12 inches high; spreading rosette-like clumps; pink flowers most of the summer; excrusted type of saxifrage does best in half shade in an alkaline soil that is moist but provided with good drainage
- Sedum* species stonecrop; grow in spreading clumps or in rosettes; giving a ground cover effect; flowers vary from white to yellow, rose, or purple; some species flower as early as May, others through the season until the latest which flower in September and October; need good drainage
- Semprevivum* species; hens and chickens; grown mainly for rosette foliage effects; best in well-drained and dry situation
- Thymus serpyllum* and vars.; thyme; 3 to 6 inches high; spreading, ground cover effect; pink or purple flowers in June and July, then scattered to September; good plant for sunny dry location
- Tunica saxifraga* var. *florae-pleno*; tunic flower; 4 to 8 inches high; forms spreading clumps; white or pink flowers in June and July
- Veronica prostrata* (*V. rupestris*); 3 to 6 inches high; blue or pink flowers in May; tolerates light shade
- Viola cornuta*; tufted pansy; 4 to 8 inches high; violet, yellow, or purple flowers in May through September

#### ROCK-GARDEN PLANTS FOR DRY-WALL PLANTINGS

Scientific name	Common name	Color	Season
<i>Aethionema</i> sp.	Stonecress	Pink, purple	May, June
<i>Alyssum</i> sp.	Yellowtuft	Yellow	May, June
<i>Androsace</i> sp.	Rock Jasmine	Lavender	May, June
<i>Arabis caucasica</i>	Rockcress	White	April, May
<i>Aubrieta deltoidea</i>	False Rockcress	Purple	April, May
<i>Campanula portenschlagiana</i>	—	Lavender	June
<i>Campanula poscharskyana</i>	—	Lavender, blue	June
<i>Campanula rotundifolia</i>	Harebell	Purple	June-August
<i>Heuchera sanguinea</i>	Coralbells	Red	June-September
<i>Iberis sempervirens</i>	Perennial Candytuft	White	May
<i>Phlox subulata</i>	Moss Pink	Various	May
<i>Saponaria ocymoides</i>	Soapwort	Pink	May-July
<i>Saxifraga</i> sp. (encrusted)	Saxifrage	White	June
<i>Sedum</i> sp.	Stonecrop	Various	May-September
<i>Semprevivum</i> sp.	Hens and Chickens	Grown for foliage only	
<i>Thymus serpyllum</i> and vars.	Thyme	Pink, purple	June, July

## THE PLACE OF SHRUBS

No rock garden, however small, is complete without at least a few shrubs. They are essential for the sake of variety and contrast, the larger ones to serve as a background and the smaller ones to use upon the garden itself. Suitable for the background are many of the taller-growing forms of the commoner evergreens which can be interspersed at will with deciduous trees or shrubs. But the rock garden itself is probably an attempt to imitate a mountain scene on a small scale. Instead of 30-foot cliffs, those of the garden will be of as many inches; so to carry out the idea correctly, it is necessary to restrict the selection of trees and shrubs to those varieties which will be proportional in size to the rocks. It is fortunate that there exists a great variety of small shrubs from which to choose, varying in size and habit from trailing ground covers to dwarf flowering bushes and small evergreens of every desirable shape. Perhaps the conifers are the most valuable. There are gnarled and spreading forms for the windswept hill-tops, bushy forests for the lower slopes, and tiny, upright spiky trees for the sheltered valley bottoms—a rich selection, and, as a group, almost as necessary in the rock garden as the rocks themselves.

## MAINTENANCE

CARE of the rock garden should not be an arduous task. The most persistent problem will be the elimination of weeds. But, attacked systematically before they have become so big as to injure the small plants in their removal, they will not exist as a menace for long.

In early winter a light mulch will protect the plants and obviate the worst effects of frost heaving. A covering such as this is most necessary in the more southerly or low lying parts of the State where the snow blanket is apt to be light or of short duration. No mulch, however, should be so heavy that it packs down too tightly. Many rock-garden subjects are semi-evergreen. They need to breathe through winter and they abhor, more than all else, a sodden close confinement.

One of the best mulch materials is salt-marsh hay. It is light and does not pack; but away from the coast salt hay is somewhat difficult to obtain. Two other materials have shown good promise in trials at Cornell University. One is a product of glassworks, a white, fluffy, 2-inch thick spread which is known as *fibrous glass*; the other, ordinary wood excelsior such as may be purchased in bales or salvaged from packing cases. Fibrous glass is slightly more expensive than the usual mulch material, but both this and the excelsior can be dried after removal and stored away for future seasons. Their outstanding qualities are lightness and airiness which is so essential

in anything to be used for this purpose. Special plants rather than the entire garden may be all that it is absolutely necessary to protect; but, if the right sort of mulch is used, no harm will result from a complete covering, which in many respects is desirable. In the spring the mulches are removed, dried, and stored. Frost-heaved plants need firming into place, and the garden in general should be given a thorough cleaning.

Spring is the time for new planting and replacement. A small nursery plot where young plants can be propagated by seed or cuttings is a useful adjunct to the rock garden, particularly in the Spring when a few blank spaces are certain to appear. If young plants are to be ordered from nurseries, they should be delivered in April for planting only when the soil is moist. If the weather is already dry, the ground should be thoroughly watered a few hours before planting. The ball of the young plant should also be fairly moist. In digging a plant or in removing one from a pot, as much soil as possible should be retained upon the roots. When the plant has been carefully set and its roots firmed, it will be ready for a good soaking.

As soon as planting is completed, a thin top dressing with some good rich soil, spread over the entire garden, will fill in places where the old soil has been washed away during winter. It will cover over any exposed roots and provide an additional food supply for the coming year. A mixture of screened leafmold and sharp gritty sand serves this general purpose. A little well-rotted manure added to the mixture would be appreciated by a limited number of plants. Primulas in particular, besides liking moisture, can stand fairly rich growing conditions. Manure, however, must be used in the rock garden with care. This top dressing can be lightly forked into the soil in the open spaces between plant groups.

As the season advances the plants will need attention from time to time. Old flower heads must be removed before the seeds commence to swell. Rampant growers must be restricted in growth or removed bodily as they tend to fill not only their own territory but that of their neighbors.

One of the most serious rock-garden problems of this region is that of summer drought. However carefully the garden may have been constructed, it is often extremely difficult to guard adequately against the midsummer season when incessant baking suns are apt to reduce everything to a growth-inhibiting dryness. A possible solution might be the use of a summer mulch. A mulch of stone chippings is helpful in certain places, particularly in the moraine and on the lower slopes where they give a pleasing rock-slide effect. They are certainly effective in retaining a considerable amount of moisture; also they help to keep down weeds, to ward off the attacks of marauding slugs, and to protect the crowns of tight-fitting plants from rot during excessively wet weather. Other materials make desirable summer mulches. Peat

moss is used to some extent but it does not have a pleasing color and in light showers it itself absorbs too much of the water that the plant should be receiving. Buckwheat hulls are relatively easy to obtain and are not objectionable in color. Although somewhat coarse they do not look too out of place between the rocks. They are efficient in retaining soil moisture and merit wider trial for this purpose.

The more obvious way to counteract dryness is by irrigation. The hose and the sprinkler are helpful and usually will solve the problem, but for watering a rock garden they leave much to be desired. Subirrigation by means of a system of perforated pipes from which water can be distributed when needed is undoubtedly the ideal method. The pipes should be of sufficient size, of durable metal, and spaced so as to give an even distribution of water. Copper piping is the most lasting, although it is costly. Connections will be made with the regular water supply unless the property happens to have a stream or spring where it may be possible to use a gravity-flow system. Subirrigation, the principle of the moraine, might include the whole garden. It is a costly system but is worth the expense if one can afford to use it.



FIGURE 25. *ACHILLEA SIBIRICA*

The dwarf achilleas, with their gray or cut foliage, are excellent for dry places

An important item of maintenance in an all-around garden includes those sundry jobs which are undertaken in an effort to prolong the color period. From the flower standpoint the real season of the garden is May and June; but if design has been good and if construction and planting have been done carefully, the rock garden should remain attractive and interesting throughout the year quite independent of flower display. The rocks will be there and many plants will be interesting in color and texture of foliage long after their flowers have faded. At times, however, a continued flower display is looked for after the main rock-plant season. A number of rock plants blossom quite late; a top-dressing in early summer will encourage campanulas, candytuft, and others to provide a second period of bloom; but for quantity of color in late summer there is only one solution, the use of annuals. Fortunately, the list of suitable annuals which can be used for this purpose is constantly increasing. Normally these are sown in the vacant spots in the garden during May. With attention given to watering and thinning, they will quickly develop and carry on the flower display until the frosts of fall. It is not suggested that annuals are always necessary in the rock garden; it is not suggested that they can be used with anything less than extreme care, particularly in the small garden. At best, their use depends purely upon the tastes and particular needs of the owner. Under certain circumstances they can fulfill a very useful purpose. But their selection should be made cautiously. They must not overcrowd the permanent plants; they should not be too rampant or, above all, include common herbaceous border varieties which would tend to detract from the spirit of the rock garden.

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A publication of the  
New York State College of Agriculture,  
a unit of the State University of New York,  
at Cornell University



Cooperative Extension Service, New York State College of Agriculture at Cornell University and the U. S. Department of Agriculture cooperating. In furtherance of Acts of Congress May 8, June 30, 1914. M. C. Bond, Director of Extension, Ithaca, New York.